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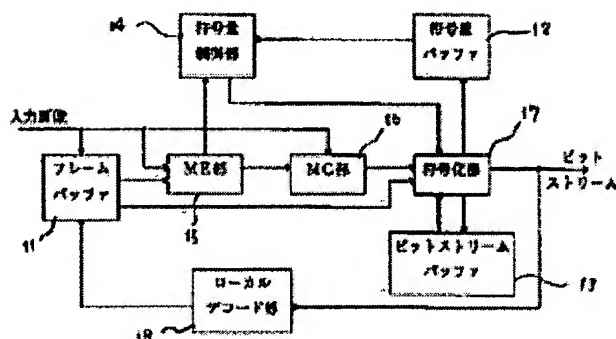
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**Abstract:**

**PROBLEM TO BE SOLVED:** To eliminate changes in an image which is used to happen by a decode image difference of an I frame and to improve an image visual quality with respect to a still area part such as a background by reading a code of the I frame 1 GOP prior to a bit stream buffer in the case of a macroblock that is decided to be a still area and encoding the code as a code of the still area.

**SOLUTION:** In a code amount control part 14, with respect to a macroblock which is decided to be a still area, a code amount of a corresponding macroblock in an I frame 1 GOP before is read from a code amount buffer 12 and integrated on the basis of a still/dynamic area decision result from an ME part 15. In an encoding part 17, encoding is performed on the basis of the still/dynamic area decision result and a target code amount supplied by the code amount control part 14 by macroblocks. In the

case of the still area, a code of the corresponding macroblock in the I frame 1 GOP before in a bit stream buffer 13 is read and this is outputted as a code of a present macroblock.



#### JPO Machine translation abstract:

##### (57) Abstract

**SUBJECT** The coding equipment of a picture using MPEG is provided.

**Means for Solution** The buffer 11 which accumulates the I frame (F) in front of 1GOP in an image encoding apparatus, The motion vector primary detecting element 15 which judges stillness and a motion area for every MB between IF in front of 1GOP, and the present IF when F which performs the present processing is IF, The code amount buffer 12 which accumulates a generated code amount for every MB of IF, and the bit stream buffer 13 which accumulates a bit stream generated for every MB of said IF per MB, From MB judged in said primary detecting element to be a static region, read a generated code amount of IF in front of 1GOP from said buffer 12, and it asks for total, The code quantity controller 14 which computes target code quantity of MB judged with the remaining code amounts in said primary detecting element to be a motion area, MB judged to be said motion area codes according to said target code quantity, In the case of the coding part 17 which numerals of IF in front of 1GOP are read from said buffer 13 in MB judged to be said static region, and codes as numerals of said static region, and PF and BF, it had the motion compensation section 16 which performs motion compensation prediction.

#### Claim(s)

**Claim 1** A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A bit stream buffer which accumulates a bit stream generated for every macro block of said I frame in a macro block unit, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity

controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from said code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A coding part which a macro block judged to be said motion area codes according to said target code quantity, and numerals of the I frame in front of 1GOP are read from said bit stream buffer in the case of a macro block judged to be said static region, and codes as numerals of said static region. An image encoding apparatus which comprising a motion compensation section which performs motion compensation prediction in the case of p frames or the B frame.

**Claim 2A** frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a processing frame is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A quantized value buffer which accumulates a quantized value for every macro block of said I frame, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, An image encoding apparatus which comprising a motion compensation section which performs motion compensation prediction in the case of p frames or the B frame.

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## Detailed Description of the Invention

### 0001

**Field of the Invention**This invention relates to coding of the picture which used MPEG.

### 0002

**Description of the Prior Art**The sequence of the image coding using MPEG is shown in drawing 3. Here, the p frames which constitute the unit called GOP in a multiple frame, perform frame inner code-ization called the I frame in one of frames of this, and perform forward prediction for other frames, and B frame coding which performs both-directions prediction are performed. Each frame is divided into the unit called a macro block, and in the case of p frames and the B frame, a motion vector is detected for every macro block, it determines coding mode, determines a quantized value, and performs coding of a prediction error, a motion vector, and coding mode. In the case of the I frame, it codes by determining a quantized value for every macro block.

**0003**To a stationary part, by p frames, it is choosing NoMCNotCoded which makes a motion vector zero and does not code a prediction error, and the picture of the same position of the previous I frame is copied and outputted by the decoded picture. The picture similarly decoded by making a motion vector into zero and not sending a prediction error in the B frame can reproduce the same picture as the previous I frame. Thus, it is possible to code all the frames in GOP about a stationary part, so that the same decoding picture as the I frame may be acquired.

**0004**However, since coding is performed within a frame about the following I frame, coding is performed regardless of the I frame in front of 1GOP. For this reason, it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part, noises in a picture, etc. even if it was the same quantized value. In such a case, the stationary part became a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and degradation on vision was caused.

### 0005

**Problem(s) to be Solved by the Invention**About the following I frame, coding is performed regardless of the I frame in front of 1GOP, and it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control

about a stationary part for this reason, noises in a picture, etc. even if it was the same quantized value. In such a case, a stationary part serves as a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and there was a problem of causing degradation on vision.

#### 0006

**Means for Solving the Problem**In order to solve this problem, an invention of Claim 1, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A bit stream buffer which accumulates a bit stream generated for every macro block of said I frame in a macro block unit, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from said code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which numerals of the I frame in front of 1GOP are read from said bit stream buffer in the case of a macro block judged to be said static region, and codes as numerals of said static region, In the case of p frames or the B frame, comprise a motion compensation section which performs motion compensation prediction, and an invention of Claim 2, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A quantized value buffer which accumulates a quantized value for every macro block of said I frame, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, In the case of p frames or the B frame, it comprised a motion compensation section which performs motion compensation prediction.

#### 0007

**Embodiment of the Invention**One working example of the coding equipment by this invention is described below with drawing 1. The coding equipment which becomes this invention as shown in drawing 1 comprises the frame buffer 11, the code amount buffer 12, the bit stream buffer 13, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, and the local decoding part 18.

**0008**As for p frames and the B frame, the following processings are performed as usual. An inputted image is supplied to the ME section 15 which detects a motion vector, and MC part 16 which performs motion compensation prediction.

**0009**In the ME section 15, between the image comparison which local decoding is carried out by the local decoding part 18, and is accumulated in the three frame buffers 11, and an inputted image, block matching is carried out to a macro block unit, and the optimal motion vector is detected. The detected motion vector is supplied to MC part 16. In MC part 16, prediction mode is determined as a macro block unit from the motion vector supplied, an inputted image, and the image comparison in the three frame buffers 11, and prediction mode, a motion vector, and a prediction error are supplied to the coding part 17.

**0010**In the coding part 17, based on the quantized value instructed to be the prediction mode and the motion vector which are supplied from MC part 16, and a prediction error from the code quantity controller 14, quantization of a prediction error and the coding which combined prediction mode and

a motion vector are performed, and a bit stream is generated and outputted.

**0011**Before coding by supplying an inputted image to the three frame buffers 11 and the ME section 15 in the case of the I frame, an inputted image is accumulated in the three frame buffers 11. An inputted image and the I frame before accumulating in the three frame buffers 11 beforehand are supplied to the ME section 15, and a motion vector is detected to a macro block unit. When the detected motion vector is zero and there is nothing at a static region and zero, the information on stillness and a motion area decision result is supplied to the code quantity controller 14 as a motion area.

**0012**In the code quantity controller 14, it integrates about the macro block judged to be a static region by reading the code amount of the corresponding macro block in the I frame in front of 1GOP from the code amount buffer 12 based on the stillness and the motion area decision result from the ME section 15. From the addition code amount about the macro blocks of all the I frames (Is), the value which subtracted the target code quantity (Ia) of the present I frame is considered as the addition (Im) of the target code quantity of the macro block judged to be a motion area, and code quantity control is performed to the coding part 17.

**0013**In the coding part 17, it codes based on the stillness and the motion area decision result, and target code quantity which are supplied to a macro block unit from the code quantity controller 14. In the case of a static region, the numerals of the macro block to which the I frame in front of 1GOP in the bit stream buffer 13 corresponds are read, and it outputs this as numerals of the present macro block.

**0014**In the case of a motion area, the macro block of I frame of the present GOP is read from the three frame buffers 11, and it codes so that it may become target code quantity. Numerals are outputted as a bit stream for every macro block generated, and it is accumulated in a macro block unit in the bit stream buffer 13.

**0015**A generated code amount is accumulated in a macro block unit at the code amount buffer 12. Since a virtual buffer causes underflow and an addition code amount (Is) cannot code to the target code quantity (Ia) of the present I frame when large, all the macro blocks are made into a motion area, and all the macro blocks are coded.

**0016**Other working example of the image encoding apparatus of this invention is described below with drawing 2. The coding equipment which becomes this invention as shown in drawing 2 comprises the frame buffer 11, the code amount buffer 12, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, the local decoding part 18, and the quantized value buffer 19. Although the numerals for every macro block were accumulated in drawing 1, the quantized value for every macro block is accumulated in drawing 2.

**0017**Since a quantized value can be expressed by 5 bits of the value to 0-31, thereby, it can reduce memory quantity. In this case, about a static region, it codes by the coding part 17 reading a quantized value from a macro block and the quantized value buffer 19 corresponding from the I frame in front of 1GOP in the three frame buffers 11. A quantized value is accumulated in the quantized value buffer 19 for every macro block about all the macro blocks.

#### **0018**

**Effect of the Invention**By this invention, change of the picture which had occurred according to the decoding picture difference of the I frame is lost about static region portions, such as a background, and vision top image quality improves.

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**Field of the Invention**This invention relates to coding of the picture which used MPEG.

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**Description of the Prior Art**The sequence of the image coding using MPEG is shown in drawing 3. Here, the p frames which constitute the unit called GOP in a multiple frame, perform frame inner code-ization called the I frame in one of frames of this, and perform forward prediction for other frames, and B frame coding which performs both-directions prediction are performed. Each frame is divided into the unit called a macro block, and in the case of p frames and the B frame, a motion vector is detected for every macro block, it determines coding mode, determines a quantized value, and performs coding of a prediction error, a motion vector, and coding mode. In the case of the I

frame, it codes by determining a quantized value for every macro block.

**0003**To a stationary part, by p frames, it is choosing NoMCNotCoded which makes a motion vector zero and does not code a prediction error, and the picture of the same position of the previous I frame is copied and outputted by the decoded picture. The picture similarly decoded by making a motion vector into zero and not sending a prediction error in the B frame can reproduce the same picture as the previous I frame. Thus, it is possible to code all the frames in GOP about a stationary part, so that the same decoding picture as the I frame may be acquired.

**0004**However, since coding is performed within a frame about the following I frame, coding is performed regardless of the I frame in front of 1GOP. For this reason, it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part, noises in a picture, etc. even if it was the same quantized value. In such a case, the stationary part became a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and degradation on vision was caused.

**Effect of the Invention**By this invention, change of the picture which had occurred according to the decoding picture difference of the I frame is lost about static region portions, such as a background, and vision top image quality improves.

**Problem(s) to be Solved by the Invention**About the following I frame, coding is performed regardless of the I frame in front of 1GOP, and it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part for this reason, noises in a picture, etc. even if it was the same quantized value. In such a case, a stationary part serves as a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and there was a problem of causing degradation on vision.

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region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, In the case of p frames or the B frame, it comprised a motion compensation section which performs motion compensation prediction.

**0007**

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**0010**In the coding part 17, based on the quantized value instructed to be the prediction mode and the motion vector which are supplied from MC part 16, and a prediction error from the code quantity controller 14, quantization of a prediction error and the coding which combined prediction mode and a motion vector are performed, and a bit stream is generated and outputted.

**0011**Before coding by supplying an inputted image to the three frame buffers 11 and the ME section 15 in the case of the I frame, an inputted image is accumulated in the three frame buffers 11. An inputted image and the I frame before accumulating in the three frame buffers 11 beforehand are supplied to the ME section 15, and a motion vector is detected to a macro block unit. When the detected motion vector is zero and there is nothing at a static region and zero, the information on stillness and a motion area decision result is supplied to the code quantity controller 14 as a motion area.

**0012**In the code quantity controller 14, it integrates about the macro block judged to be a static region by reading the code amount of the corresponding macro block in the I frame in front of 1GOP from the code amount buffer 12 based on the stillness and the motion area decision result from the ME section 15. From the addition code amount about the macro blocks of all the I frames (Is), the value which subtracted the target code quantity (Ia) of the present I frame is considered as the addition (Im) of the target code quantity of the macro block judged to be a motion area, and code quantity control is performed to the coding part 17.

**0013**In the coding part 17, it codes based on the stillness and the motion area decision result, and target code quantity which are supplied to a macro block unit from the code quantity controller 14. In the case of a static region, the numerals of the macro block to which the I frame in front of 1GOP in the bit stream buffer 13 corresponds are read, and it outputs this as numerals of the present macro block.

**0014**In the case of a motion area, the macro block of I frame of the present GOP is read from the three frame buffers 11, and it codes so that it may become target code quantity. Numerals are outputted as a bit stream for every macro block generated, and it is accumulated in a macro block unit in the bit stream buffer 13.

**0015**A generated code amount is accumulated in a macro block unit at the code amount buffer 12. Since a virtual buffer causes underflow and an addition code amount (Is) cannot code to the target code quantity (Ia) of the present I frame when large, all the macro blocks are made into a motion area, and all the macro blocks are coded.

**0016**Other working example of the image encoding apparatus of this invention is described below

with drawing 2. The coding equipment which becomes this invention as shown in drawing 2 comprises the frame buffer 11, the code amount buffer 12, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, the local decoding part 18, and the quantized value buffer 19. Although the numerals for every macro block were accumulated in drawing 1, the quantized value for every macro block is accumulated in drawing 2.

**0017** Since a quantized value can be expressed by 5 bits of the value to 0-31, thereby, it can reduce memory quantity. In this case, about a static region, it codes by the coding part 17 reading a quantized value from a macro block and the quantized value buffer 19 corresponding from the I frame in front of 1GOP in the three frame buffers 11. A quantized value is accumulated in the quantized value buffer 19 for every macro block about all the macro blocks.

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### **Brief Description of the Drawings**

**Drawing 1** It is a lineblock diagram showing one working example of the coding equipment of this invention.

**Drawing 2** It is a lineblock diagram showing other working example of the coding equipment of this invention.

**Drawing 3** It is a figure showing the sequence of the image coding using MPEG.

### **Description of Notations**

- 11 Frame buffer
  - 12 Code amount buffer
  - 13 Bit stream buffer
  - 14 Code quantity controller
  - 15 ME section
  - 16 MC part
  - 17 Coding part
  - 18 Local decoding part
  - 19 Quantized value buffer
- 

### **Drawing 1**

For drawings please refer to the original document.

### **Drawing 2**

For drawings please refer to the original document.

### **Drawing 3**

For drawings please refer to the original document.

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For drawings please refer to the original document.

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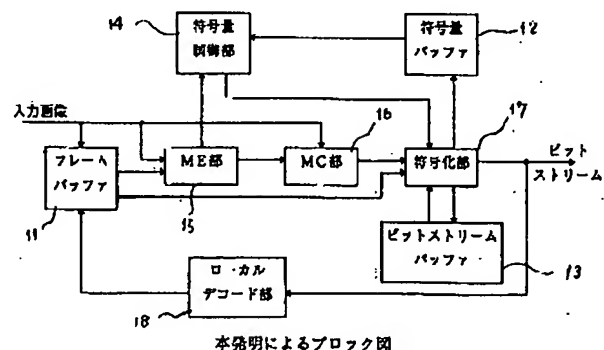
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NN21 NN28 PP05 TA49 TA62  
TB03 TB07 TC12 TC38 TD06  
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5J064 AA01 BA13 BB03 BC01 BC02  
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(54)【発明の名称】 画像符号化装置

(57)【要約】

【課題】 MPEGを用いた画像の符号化装置を提供する。

【解決手段】 画像符号化装置において、1GOP前のIフレーム(F)を蓄積するバッファ11と、現在処理を行うFがIFの場合、1GOP前のIFと現在のIF間で静止・動領域の判定をMB毎に行う動きベクトル検出部15と、IFのMB毎の発生符号量を蓄積する符号量バッファ12と、前記IFのMB毎に生成されるビットストリームをMB単位に蓄積するビットストリームバッファ13と、前記検出部で静止領域と判定されたMBに対して、1GOP前のIFの発生符号量を前記バッファ12から読み出し総和を求め、残りの符号量にて、前記検出部で動領域と判定されたMBの目標符号量を算出する符号量制御部14と、前記動領域と判定されたMBは前記目標符号量に応じて符号化を行い、前記静止領域と判定されたMBの場合は前記バッファ13から1GOP前のIFの符号を読み出し前記静止領域の符号として符号化を行う符号化部17と、PFやBFの場合は動き補償予測を行う動き補償部16とを備えた。



## 【特許請求の範囲】

【請求項1】入力画像を符号化する画像符号化装置において、

1 GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、

現在処理を行なうフレームがIフレームの場合、1 GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、

Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、

前記Iフレームのマクロブロック毎に生成されるビットストリームをマクロブロック単位に蓄積するビットストリームバッファと、

前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1 GOP前のIフレームの発生符号量を前記符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、

前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記ビットストリームバッファから1 GOP前のIフレームの符号を読み出し前記静止領域の符号として符号化を行なう符号化部と、

PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成されることを特徴とする画像符号化装置。

【請求項2】入力画像を符号化する画像符号化装置において、

1 GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、

処理フレームがIフレームの場合、1 GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、

Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、

前記Iフレームのマクロブロック毎の量子化値を蓄積する量子化値バッファと、

前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1 GOP前のIフレームの発生符号量を符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、

前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記量子化値バッファから1 G

OP前のIフレームの対応するマクロブロックの量子化値と前記3フレームバッファから1 GOP前のIフレームの対応するマクロブロックとを読み出し符号化を行なう符号化部と、

PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成されることを特徴とする画像符号化装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、MPEGを用いた画像の符号化に関する。

## 【0002】

【従来の技術】MPEGを用いた画像符号化のシーケンスを図3に示す。ここでは、複数フレームをGOPと呼ばれる単位を構成し、このうちの1フレームをIフレームと呼ばれるフレーム内符号化を行ない、その他のフレームを前方向予測を行なうPフレーム、及び、両方向予測を行なうBフレーム符号化を行なう。各フレームは、マクロブロックと呼ばれる単位に分割され、Pフレーム、Bフレームの場合は、各マクロブロック毎に動きベクトルの検出を行ない、符号化モードの決定をし、量子化値の決定を行ない、予測誤差と動きベクトルと符号化モードの符号化を行なう。Iフレームの場合は、各マクロブロック毎に量子化値の決定を行ない、符号化をする。

【0003】静止部分に対しては、Pフレームでは、動きベクトルをゼロとし予測誤差を符号化しないNoMCNotCodedを選択することで、デコードされた画像では、先のIフレームの同一位置の画像がコピーされて出力される。また、Bフレームでは、動きベクトルをゼロとし、予測誤差を送らないことで、同様にデコードされた画像は、先のIフレームと同一の画像を再生することが可能である。この様に、静止部分に関しては、GOP内の全フレームを、Iフレームと同一のデコード画像を得るように符号化を行なうことが可能である。

【0004】しかし、次のIフレームに関してはフレーム内で符号化が行なわれる為、1 GOP前のIフレームとは無関係に符号化が行なわれる。このため、静止部分に関して、量子化値が符号量制御により異なった値になる場合や、また、画像中のノイズ等により同一の量子化値であっても、異なったデコード画像となることがある。この様な場合、静止部分が、GOP毎に異なる画像となり、従ってGOPの単位でその変化が視覚上目立つこととなり、視覚上の劣化を引き起こしていた。

## 【0005】

【発明が解決しようとする課題】次のIフレームに関しては、1 GOP前のIフレームとは無関係に符号化が行なわれ、このため、静止部分に関して、量子化値が符号量制御により異なった値になる場合や、また、画像中のノイズ等により同一の量子化値であっても、異なったデコード画像となることがある。この様な場合、静止部分

が、GOP毎に異なる画像となり、従ってGOPの単位でその変化が視覚上目立つこととなり、視覚上の劣化を引き起こすという問題点があった。

#### 【0006】

【課題を解決するための手段】この問題を解決するために、請求項1の発明は、入力画像を符号化する画像符号化装置において、1GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、現在処理を行なうフレームがIフレームの場合、1GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、前記Iフレームのマクロブロック毎に生成されるビットストリームをマクロブロック単位に蓄積するビットストリームバッファと、前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1GOP前のIフレームの発生符号量を前記符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記ビットストリームバッファから1GOP前のIフレームの符号を読み出し前記静止領域の符号として符号化を行なう符号化部と、PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成され、請求項2の発明は、入力画像を符号化する画像符号化装置において、1GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、現在処理を行なうフレームがIフレームの場合、1GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、前記Iフレームのマクロブロック毎の量子化値を蓄積する量子化値バッファと、前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1GOP前のIフレームの発生符号量を符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記量子化値バッファから1GOP前のIフレームの対応するマクロブロックの量子化値と前記3フレームバッファから1GOP前のIフレームの対応するマクロブロックとを読み出し符号化を行なう符号化部と、PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成されるようにした。

#### 【0007】

【発明の実施の形態】本発明による符号化装置の一実施例を図1と共に以下に説明する。図1に示すように本発明になる符号化装置は、フレームバッファ11、符号量バッファ12、ビットストリームバッファ13、符号量制御部14、ME部15、MC部16、符号化部17及びローカルデコード部18より構成される。

【0008】Pフレーム及びBフレームは、従来と同様に以下の処理が行なわれる。入力画像は、動きベクトルの検出を行なうME部15、及び、動き補償予測を行なうMC部16に供給される。

【0009】ME部15では、ローカルデコード部18でローカルデコードされ3フレームバッファ11に蓄積されている参照画像と、入力画像間で、マクロブロック単位にブロックマッチングを行ない最適な動きベクトルの検出を行なう。検出された動きベクトルは、MC部16に供給される。MC部16では、供給される動きベクトルと入力画像及び3フレームバッファ11中の参照画像から予測モードの決定をマクロブロック単位に行ない、予測モード、動きベクトルと予測誤差を符号化部17に供給する。

【0010】符号化部17では、MC部16から供給される予測モード、動きベクトルと予測誤差と、符号量制御部14から指示される量子化値に基づき予測誤差の量子化と、予測モード、動きベクトルを併せた符号化を行ない、ビットストリームを生成し出力する。

【0011】Iフレームの場合は、入力画像は、3フレームバッファ11とME部15に供給され、符号化を行なう前に、入力画像は、3フレームバッファ11に蓄積される。ME部15には、入力画像と、3フレームバッファ11に予め蓄積されている以前のIフレームとが供給されて、動きベクトルの検出をマクロブロック単位に行なう。検出された動きベクトルがゼロの場合は静止領域、ゼロで無い場合は動領域として、符号量制御部14に静止・動領域判定結果の情報を供給する。

【0012】符号量制御部14では、ME部15からの静止・動領域判定結果を基に、静止領域と判定されたマクロブロックに関して、1GOP前のIフレームでの対応するマクロブロックの符号量を符号量バッファ12から読み出し、積算を行なう。Iフレーム全てのマクロブロックに関しての積算符号量(Is)から、現在のIフレームの目標符号量(Ia)を引いた値を、動領域と判定されたマクロブロックの目標符号量の積算(I<sub>m</sub>)とし、符号化部17に対して符号量制御を行なう。

【0013】符号化部17では、マクロブロック単位に符号量制御部14から供給される、静止・動領域判定結果と目標符号量をもとに符号化を行なう。静止領域の場合は、ビットストリームバッファ13中の1GOP前のIフレームの対応するマクロブロックの符号を読み出し、これを現在のマクロブロックの符号として出力する。

【0014】動領域の場合は、現在のGOPのIフレームのマクロブロックを3フレームバッファ11より読み出し、目標符号量になるように符号化を行なう。生成されるマクロブロック毎に符号は、ビットストリームとして出力されると共に、マクロブロック単位に、ビットストリームバッファ13に蓄積される。

【0015】また、発生符号量をマクロブロック単位に符号量バッファ12に蓄積する。また、現在のIフレームの目標符号量(Ia)に対して、積算符号量(Is)が、大きい場合は、仮想バッファがアンダーフローを起こすので符号化が行なえないため、全てのマクロブロックを動領域とし、全てのマクロブロックの符号化を行なう。

【0016】また、本発明の画像符号化装置の他の実施例について図2と共に以下に説明する。図2に示すように本発明になる符号化装置は、フレームバッファ11、符号量バッファ12、符号量制御部14、ME部15、MC部16、符号化部17、ローカルデコード部18及び量子化値バッファ19より構成される。図1では、マクロブロック毎の符号を蓄積していたが、図2では、マクロブロック毎の量子化値を蓄積する。

【0017】量子化値は0～31までの値の5ビットで表現することが出来るため、これによりメモリ量の削減が行なえる。この場合、静止領域に関しては、3フレームバッファ11中の1GOP前のIフレームから対応するマクロブロックと量子化値バッファ19より量子化値と

を符号化部17が読み出し、符号化を行なう。全てのマクロブロックに関して、量子化値を量子化値バッファ19にマクロブロック毎に蓄積する。

【0018】

【発明の効果】本発明により、背景等の静止領域部分に関して、Iフレームのデコード画像差により起きていた画像の変化が無くなり、視覚上画質が向上する。

【図面の簡単な説明】

【図1】本発明の符号化装置の一実施例を示す構成図である。

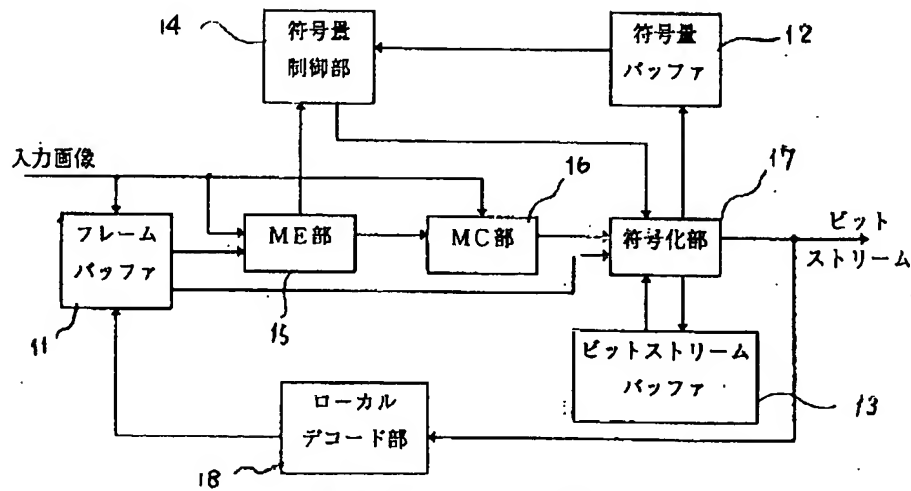
【図2】本発明の符号化装置の他の実施例を示す構成図である。

【図3】MPEGを用いた画像符号化のシーケンスを示した図である。

【符号の説明】

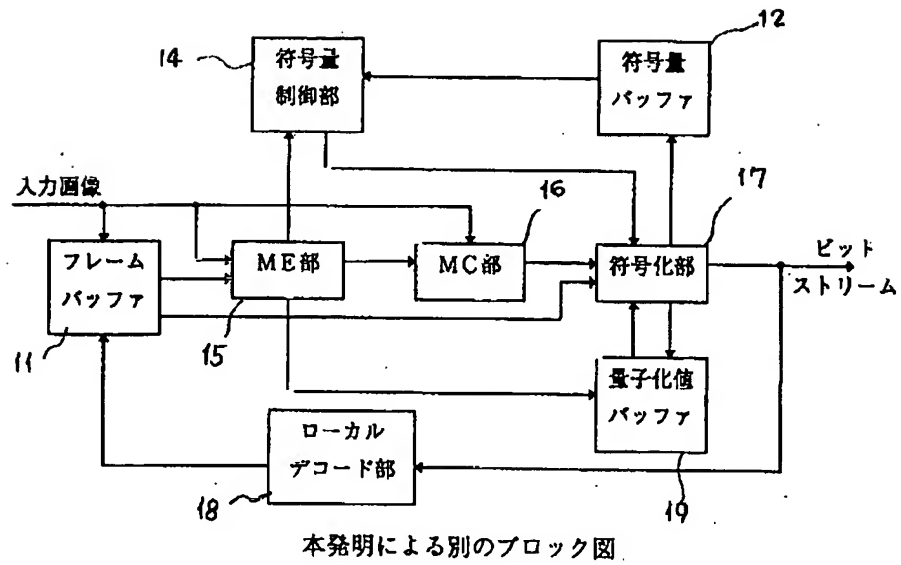
- 11 フレームバッファ
- 12 符号量バッファ
- 13 ビットストリームバッファ
- 14 符号量制御部
- 15 ME部
- 16 MC部
- 17 符号化部
- 18 ローカルデコード部
- 19 量子化値バッファ

【図1】



本発明によるブロック図

【図2】



【図3】

